

# UNITED STATES SIGNAL SERVICE

## MONTHLY WEATHER REVIEW.

VOL. XVI.

WASHINGTON CITY, DECEMBER, 1888.

No. 12.

### INTRODUCTION.

This REVIEW treats generally the meteorological conditions of the United States and Canada for December, 1888, and is based upon reports of regular and voluntary observers of both countries.

On chart i the paths of the centres of eight areas of low pressure are shown; the average number traced for December during the last fifteen years being 11.6.

The areas of high and low pressure are discussed under their respective headings. Descriptions of the storms that occurred over the north Atlantic Ocean are also given, and their approximate paths shown on chart i, on which also appear the limits of fog-belts west of the fortieth meridian. No ocean ice was reported during the month. Over the north Atlantic severe storms occurred off the coast of the United States from the 11th to 14th and 17th to 19th; over mid-ocean heavy gales were reported on the 4th, 9th, 18th, and 20th, while over the eastern part of the ocean the severest disturbances occurred on the 21st and 22d.

Chart ii exhibits the distribution of mean atmospheric pressure and mean temperature for the month. The mean temperature was above the normal over a greater part of the country, the greatest departures above the normal being noted in Montana and Dakota, where, at stations, they amounted to more than 15°. Over portions of the south Atlantic, middle, and eastern Gulf states the mean temperature was below the normal, the greatest deficiencies being shown over southern Florida, where they exceeded 4°. The means were also slightly below the normal within an area extending from southeast Arizona to north-central California. At a number of stations in the north-central and northwest districts the maximum temperatures were higher than for any preceding December during the periods of observation.

The distribution of rainfall for December, 1888, is shown on chart iii, and the normal precipitation for eighteen years is exhibited on chart iv.

The precipitation was in excess of the normal in California and the southern plateau region, within an area extending from central Texas northward to the lower Missouri valley, in portions of the upper lake region and the upper Mississippi valley, southern Florida, and from the northern part of the middle Atlantic states to the Canadian Maritime Provinces, except in a small area along the south New England coast. Elsewhere in the United States and Canada there was a deficiency in rainfall. Over a considerable portion of the country the departures from the normal December rainfall were marked. The current and normal precipitation at the various stations and in the several districts is treated in detail under the head-

ing of "Precipitation." In the table of excessive precipitation will be found a record of excessive monthly, daily, and hourly rainfalls for December; in a supplementary table excessive monthly, daily, and hourly rainfalls, not before available for publication, are given for each month for the periods of observation for all stations from which precipitation reports have been received. Following the table of supplementary excessive precipitation will be found a list of errors detected in the series of tables of excessive precipitation published in the REVIEW during 1888. The series of excessive precipitation tables published monthly during 1888, together with the supplementary table which appears in the current REVIEW, embraces all data of this class contained in reports received to date.

Chart v exhibits the depth of snow on the ground at the close of the month. It is proposed to publish similar charts in the REVIEW showing the depth of snow on the ground on the 15th and last day of each of the winter months. In the current month the depth of snow on the 15th was insufficient to admit of charting, and the small amount of snow which fell throughout the northern portion of the country constituted an unusual and noteworthy feature. This chart also shows the limits of freezing weather during December, 1888.

Commencing with July, 1888, the meteorological means for the regular stations of the Signal Service have been determined from observations taken twice daily at 8 a. m. and 8 p. m. (75th meridian time). These hours of observation have been permanently adopted to supersede the former system of tri-daily observations taken at eight-hour intervals.

In the preparation of this REVIEW the following data, received to January 20, 1889, have been used: the regular semi-daily weather-charts, containing data of simultaneous observations taken at 133 Signal Service stations and 22 Canadian stations, as telegraphed to this office; 175 monthly journals and 177 monthly means from the former and 22 monthly means from the latter; 420 monthly registers from voluntary observers; 95 monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports through the co-operation of the Hydrographic Office, United States Navy, and the "New York Herald Weather Service;" monthly weather reports from the local weather services of Alabama, Arkansas, Colorado, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New England, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, Tennessee, and Texas, and the Central Pacific Railway Company; trustworthy newspaper extracts, and special reports.

### ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for December, 1888, as determined from observations taken daily at 8 a. m. and 8 p. m. (75th meridian time), is shown on chart ii by isobars. On July 1, 1888, the tri-daily observations of

the Signal Service were superseded by observations taken twice daily at the hours named. A protracted series of hourly observations has shown that the difference is almost inappreciable between the mean pressure obtained from two obser-

vations taken at these hours and that determined from tri-daily observations taken at eight-hour intervals.

The mean pressure for December, 1888, is highest at stations in the middle plateau region of the Rocky Mountains, where it rises to 30.25, and over portions of Tennessee and the eastern Gulf states, where the values are above 30.20. The area of lowest mean pressure occupies the Gulf of Saint Lawrence, where the readings fall to 29.80 at Sydney, C. B. I. In the north Pacific coast region the mean pressure decreases northward to Tatoosh Island, Wash., where a reading of 29.89 is reported. As compared with the pressure chart for November, 1888, a decrease in pressure is shown north of a line traced from the middle Pacific coast and middle plateau region southeastward into Texas, and thence to the Atlantic coast in about lat. N. 37°; to the southward of this line there has been an increase in pressure. The greatest decrease has occurred over the Canadian Maritime Provinces, where it amounts to .27 at Sydney, C. B. I., and the most marked increase is noted over the southern plateau region of the Rocky Mountains, where at stations in Arizona the mean pressure is .11 and .12 higher than for the preceding month. Over the northern portions of the country the decrease becomes less marked from the Atlantic and Pacific coasts to Montana, where it averages less than .05, while over Florida, the eastern Gulf states, and along the immediate west Gulf coast the increase ranges from .05 to .09.

As compared with the normal pressure for December the mean pressure was below the normal over Canada, New England, the middle Atlantic states, a greater part of the Lake region, the upper Mississippi and Missouri valleys, the western portions of the plateau regions of the Rocky Mountains, and along the Pacific coast, the greatest deficiencies occurring over the Canadian Maritime Provinces, and along the Pacific coast between the fortieth and forty-fifth parallels, where they exceed .10. From Michigan southward to the Gulf of Mexico and thence northwestward over the Rocky Mountain regions to the upper valley of the Columbia River, and generally over the more Southern States and territories east of the one hundred and fifteenth meridian, the pressure was above the normal, the most marked excesses appearing in Colorado and southeastern Wyoming, where they amounted to .07 and .08, respectively. Within a limited area extending over parts of Louisiana and Mississippi a small deficiency was shown.

#### BAROMETRIC RANGES.

The monthly barometric ranges at the various Signal Service stations are given in the table of miscellaneous meteorological data. The general rule, to which the monthly barometric ranges over the United States are found to conform, is that they increased with the latitude and decreased slightly, though somewhat irregularly, with increasing longitude. In December, 1888, the ranges decreased from the south New England coast, where they exceeded 1.80, to the upper Mississippi valley, where they were less than .90. From this region there was an increase of more than .40 to the northern plateau region of the Rocky Mountains, from whence there was a decrease to the Pacific coast. Along the Atlantic coast the extreme ranges varied from .49 at Key West, Fla., to 1.83 at Block Island, R. I.; between the eighty-second and ninety-second meridians, .76 at Pensacola, Fla., and Montgomery, Ala., to 1.07 at Alpena, Mich.; between the Mississippi River and Rocky Mountains, .56 at Corpus Christi, Tex., to 1.18 at Denver, Colo.; in the plateau and Rocky Mountain regions, .52 at Yuma, Ariz., to 1.33 at Helena, Mont.; on the Pacific coast, .47 at San Diego, Cal., to 1.06 at Olympia, Wash.

#### AREAS OF HIGH PRESSURE.

Six areas of high pressure were observed within the limits of the United States during December. They all moved to the south of east, and five reached the Atlantic or Gulf coast. Three were first observed in the region north of Montana and Dakota, all of which disappeared to the east of Virginia or

North Carolina. The remaining three were first observed over California or the central plateau region and moved slowly to the southeastward; two of these disappeared after reaching the Gulf states and the other disappeared in the southern Rocky Mountain region by a gradual decrease of pressure. During the month only two areas of high pressure passed over the Northern States east of the Mississippi, and an examination of the weather charts shows that the mean track of the areas of high pressure lies considerably to the southwest of the normal track of such areas for December; also that the number of areas of high pressure for this month was less than usual.

The following table exhibits, in a concise manner, some of the more prominent characteristics of the high areas:

No.	First observed.			Last observed.		Duration.	Velocity per h. r.	Highest pressure.		
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.			Date.	Station.	Reading.
I.....	1	37	120	34	75	7.0	19.0	2	Montrose, Colo.....	Inches. 30.62
II.....	7	42	118	37	106	3.0	11.1	9	Montrose, Colo.....	30.38
III.....	10	53	113	35	72	6.0	19.4	15	Raleigh, N. C.....	30.62
IV.....	15	37	119	29	88	6.0	18.1	18	Montrose, Colo.....	30.60
V.....	20	52	100	34	74	5.5	23.1	23	Norfolk, Va *.....	30.64
VI.....	23	52	112	37	73	6.5	18.9	30	Washington City †.....	30.64
Via.....	27	46	115	45	114	4.0	†	31	Helena, Mont.....	30.94
									Mean.....	30.63

NOTE.—Average rate of progress, 18.3 miles per hour. \* Also at Hatteras and Raleigh N. C., same date. † Also at Philadelphia, same date. ‡ Stationary.

I.—The month opened with this area advancing from the Pacific over central California, the pressure being from .10 to .20 above the normal in the central valleys, and with areas of low pressure to northeast of New England and north of Montana. This area of high pressure moved slowly to the eastward, inclining first to the northeast and afterwards to the southeast. On the morning of the 4th it covered the entire Rocky Mountain and plateau regions, extending from the west Gulf to Washington Territory, the centre being inclosed by the isobars of 30.5, 30.4, 30.3. A low area of considerable energy was central to the north of Lake Superior, where the pressure was below 29.40, thus giving a difference of 1.00 inch in pressure between Lake Superior and the Rocky Mountain stations. The area of high pressure was apparently retarded and remained over the Rocky Mountain region during the 5th, the pressure at the centre decreasing about .20, while the area of low pressure moved southward over the Lake region to the middle Atlantic coast attended by an increase of pressure of about .20 at the centre. After the 5th this area moved southeastward to the west Gulf states, where it was central on the 6th, and thence eastward over the Southern States during the 7th and 8th, disappearing to the eastward of the south Atlantic coast, the pressure decreasing during the easterly movement from the Rocky Mountain region.

II.—This was an area of high pressure of slight energy which developed over the northern plateau region during the 7th, and moved slowly southeastward until the 10th, when it was last observed central over Colorado, where it disappeared as a separate area, and apparently formed a part of high area iii which was then central north of Montana.

III.—Number iii was observed on the morning of the 10th far to the north of Montana, the pressure being generally high over the Rocky Mountain region. It moved slowly to the southeastward, attended by a moderate cold wave over the Northern States east of the Mississippi. Its general course was easterly until it reached the region of Lake Superior on the 13th, when it moved almost directly southward to the Ohio Valley and thence eastward to the Atlantic coast. This area extended, covering the greater portion of the country east of the Mississippi, and the pressure increased at the centre as the area advanced toward the coast. It was last observed as central east of North Carolina on the 16th, moving eastward.

IV.—Number iv apparently formed over southern California on the 15th, when the pressure was below the normal on the south Pacific coast and a trough of low pressure covered the eastern slope of the Rocky Mountains. It moved eastward to Arizona and thence northward to Idaho, where it was central on the 17th. It extended eastward, moving in a southeasterly direction; and on the 19th, when central in western Kansas, this area extended from the Atlantic to the Pacific while storms of considerable energy were central northeast of New England and north of Montana. The succeeding reports show that the general movement of this area was southeasterly during the 20th and 21st, and it passed over the Gulf of Mexico on the last-named date, causing freezing weather and killing frosts in northern Florida.

V.—When the preceding area of high pressure covered the lower Mississippi valley on the 20th this area appeared north of Dakota, from which region it moved southeastward to Lake Ontario, causing a decided fall in temperature in the Saint Lawrence Valley, lower lake region, and northern New England on the 22d. The direction of movement changed, and after reaching Lake Ontario it passed almost directly southward to North Carolina, where it remained almost stationary during the 23d, 24th, and 25th. The pressure decreased slowly at Atlantic coast stations after the 23d, and this area was last observed central near, and east of, Hatteras, N. C., on the 26th.

VI.—This area appeared north of Montana on the 23d and after apparently moving slowly eastward during the succeeding twenty-four hours it extended southward over the northern Rocky Mountain region during the 25th and 26th as a small but well-defined area of high pressure and was central on the 26th in southwestern Montana where the barometric pressure was 30.44, and well-marked areas of low pressure were central in the upper Mississippi valley, north of Montana, and on the north Pacific coast. This area extended southeastward from Washington Territory to the lower Mississippi valley during the 26th and 27th, after which it was apparently separated by the Rocky Mountain range, that portion east of the Rocky mountains forming an area of high pressure which moved directly eastward from Kansas to the middle Atlantic coast, the pressure increasing with the easterly movement, the maximum (30.64) occurring at Washington City and Philadelphia on the morning of the 30th, after which date this portion of the area disappeared to the eastward, while that portion of the area to the westward of the Rocky mountains remained almost stationary over the northern plateau region from the 27th to the close of the month, the pressure increasing at the centre and the area becoming more extended until the last day of the month, when the maximum pressure of the month, 30.94, was observed at Helena, Montana, and the area included within its limits the entire country, with the exception of New England.

#### AREAS OF LOW PRESSURE.

Eight well-defined areas of low pressure appeared within or near the limits of the stations of observation during the month of December. Six of these disturbances probably developed to the west of the Rocky Mountains, while one apparently developed in the lower Mississippi valley, and one was first observed north of the Lake region. The general direction of movement of all low areas observed to the west of the Mississippi Valley was to the south of east, but after reaching the Mississippi Valley the course changed to the north of east in all cases where the centre of the low area passed to the eastward within the United States. The areas of low pressure which developed in British America continued their southeasterly course until they reached the Saint Lawrence valley or Atlantic coast. Secondary disturbances developed in the southern portions of the barometric depressions developing to the eastward in three instances, and in each the secondary disturbance increased in energy and became the most marked feature of the disturbance.

The following table exhibits the principal facts regarding these low areas:

No.	First observed.			Last observed.			Duration.	Velocity per h. r.	Lowest pressure.		
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.				Date.	Station.	Reading.
I.....	4	52	90	43	59	2.5	30.0	4	4	P. Arthur's Landing, Ont.	29.36
II.....	5	53	114	47	81	1.5	48.4	6	6	Minnedosa, Man.....	29.58
III.....	8	34	95	47	58	4.5	27.8	12	12	Halifax, N.S.....	28.76
IV.....	8	51	123	48	79	3.0	29.2	8	8	Medicine Hat, N. W. T.	29.42
V.....	13	47	126	47	66	5.0	33.3	18	18	Wood's Holl, Mass.....	28.78
VI.....	19	54	113	43	66	2.5	40.8	20	20	Sault de St. Marie, Mich.	29.58
VII.....	21	53	112	46	86	3.0	26.4	22	22	Minnedosa, Man.....	29.38
VIII.....	23	42	115	51	64	5.0	31.7	28	28	Bird Rocks, G. of St. L.	28.76
										Mean.....	29.20

Average rate of progress, 33.5 miles per hour.

I.—The first low area of the month appeared north of Minnesota and Dakota on the 2d, and probably approached that region from the Pacific. It passed eastward north of United States and its centre was first definitely located on the morning of the 4th north of, and near, Lake Superior. It passed southeasterly during the 5th, forming two disturbances, one of which passed southward over the upper lake region and thence southeasterly to the middle Atlantic coast, the other moving over the Saint Lawrence Valley to northern New England, after which the two disturbances apparently united to the east of southern New England, from which point the general course of movement was to the northeast. This storm apparently attained its maximum energy while its centre was north of the Lake region on the morning of the 4th. After passing within the limits of the United States the pressure increased at the centre of disturbance, and after leaving the coast of the United States the pressure again diminished. The winds attending this storm reached a velocity of thirty-six miles per hour from southwest in the Lake region when the centre was north of Lake Huron, and on the New England and middle Atlantic coasts the maximum wind velocities ranged from forty to forty-eight miles per hour.

II.—Number ii was central north of Montana on the afternoon of the 5th, when the preceding disturbance extended over New England to the middle Atlantic states. It moved rapidly eastward north of the United States reaching Lake Superior on the afternoon of the 6th and disappearing on the 7th to the northeast of the Lake region, without causing any marked disturbance of atmospheric conditions within the United States.

III.—When the preceding area of low pressure disappeared to the northeast of the Lake region on the 7th, a trough of low pressure extended from the Saint Lawrence Valley southwestward to Arizona, with areas of high pressure over the south Atlantic coast and central plateau region. This barometric trough covered the Mississippi Valley on the following day, and the disturbance traced as number iii formed in the southern portion of this trough and was apparently forced to the southeastward by the area of high pressure from the Rocky Mountain region. It passed eastward along the east Gulf coast during the 9th, followed by brisk to high northerly winds, and on the morning of the 10th was central near Jacksonville, Fla., where the direction of movement changed to northeasterly. It followed the general direction of the coast line, the centre passing from northern Florida to Nova Scotia in forty-eight hours. Dangerous gales occurred on the New England and middle Atlantic coasts on the 11th, the storm apparently reaching its maximum energy while the centre was passing over Nova Scotia, where the minimum pressure of 28.76 was recorded on the morning of the 12th at Halifax. A maximum wind velocity of seventy miles per hour occurred at Block Island, R. I., on the afternoon of the 11th.

The following notes from the reports of Signal Service observers relate to this storm:

Cape Henry, Va., 10th: high northeasterly winds prevailed in the afternoon, increasing in force during the night, and attaining a maximum velocity of fifty miles per hour; high winds prevailed also all day on the 11th.

Philadelphia, Pa., 11th: light rain began during the night and ended at 11.15 a. m.; brisk northeasterly and brisk to high northwesterly winds prevailed from 9 a. m. throughout the day; maximum velocity, thirty-six miles per hour. The barometer fell 0.50 during the twenty-four hours ending at 8 p. m., 11th.

Block Island, R. I., 10th: light north to east winds. Order to hoist cautionary northeast signals received. Storm from the northeast began 10.30 p. m., and reached a maximum velocity of thirty miles per hour at 11.55 p. m. 11th: the storm continues; highest wind velocity, seventy miles per hour, occurred 3.30 p. m.; storm ended 7.55 p. m.

Boston, Mass.: the barometer fell rapidly during the night of the 10-11th and on the following day, and strong southeast and east winds increased gradually in velocity, blowing a gale during the afternoon of the 11th and night of the 11-12th; maximum velocity forty-four miles from north; barometer rose on the 12th, with brisk to high westerly winds; maximum velocity forty-four miles.

IV.—When area of low pressure number iii, previously described, was forming in the lower Mississippi valley this disturbance was moving eastward north of Washington Territory. It moved rapidly across the continent to the Lake region, the centre remaining north of the United States, and the rate of movement diminishing as it approached the Lake region. The pressure at the centre increased with the easterly movement and it disappeared on the 11th, apparently uniting with low area number iii off the coast of New England.

V.—On the 12th and 13th an area of low pressure covered the north Pacific coast and northern plateau region, the centre being apparently to the west of the coast line. Severe gales were reported on the 12th from the mouth of the Columbia River, the wind reaching a maximum velocity of seventy miles per hour on the 12th, sixty on the 13th, and forty-four on the afternoon of the 13th, all from the south. This storm caused general rains on the Pacific coast, the precipitation being generally heavy throughout California. It apparently moved over the northern plateau region and thence southeastward, crossing to the eastern slope of the Rocky Mountains, where it was central on the morning of the 15th. It covered the central valleys on the 16th, causing heavy rains in all states east of the Rocky Mountains. The principal centre of disturbance passed northeast towards the upper lake region, where it disappeared, a secondary disturbance forming in the southern portion of the area during the morning of the 17th and developing great energy during the day, moving rapidly northeastward along the middle Atlantic and New England coasts, attended by severe easterly shifting to westerly gales and very heavy rains. The barometer fell to 28.78 at Wood's Holl, Mass., on the morning of the 18th, when the centre was near that station. It was followed by a cold wave and snow throughout the Northern States and as far south as Tennessee and North Carolina, the fall in temperature ranging from 20° to 30° at most stations.

The following are extracts from reports of Signal Service observers:

Hatteras, N. C., 17th: storm began 11 a. m., reached a maximum velocity of forty-two miles from the south at 11.05 a. m.; continued during the remainder of the day, and ended at 8.20 a. m., 18th.

Boston, Mass., 17-18th: brisk to high southerly winds occurred during the night and the day of the 18th, maximum velocity thirty-eight miles west.

Philadelphia, Pa., 17th: a heavy rain storm set in 9.45 last night and rain has fallen steadily all day. The barometer has fallen rapidly and steadily and at midnight read 28.65 actual, a fall of 1.55 inches since noon yesterday.

There has been a corresponding rise in temperature, the mean to-day being 15° higher than yesterday; winds variable from light to fresh. Rain ended 6 p. m., but occasional light showers followed during the evening; total rainfall for the day, 2.23 inches. At 12.30 a. m., 18th, wind shifted to north-west, increasing in force to a gale (forty-eight miles) between 3 and 4 a. m., continuing high all day and diminishing in force during the afternoon. The change in wind shortly after midnight corresponded with lowest barometer, 28.65 actual. The rise in the barometer after 1 a. m. was as rapid as had been its fall during the preceding day. The change in barometric pressure is represented by an inverted cone, with depth of 1.5 inches. Rain ended shortly after midnight.

VI.—This storm was central far to the north of Montana on the morning of the 19th, and the reports indicate that it probably developed in the north Pacific. It passed southeastward towards Lake Superior, where it was central on the morning of the 20th, and thence over the upper Saint Lawrence valley to the New England coast. It was followed quickly by an area of high pressure, which caused strong northerly winds and a decided fall of temperature in the west quadrants of this storm when it was central off the New England coast.

VII.—This area of low pressure also appeared north of Montana, and probably it originated to the west of the Pacific coast. It moved eastward to Manitoba, where it was central on the morning of the 22d, while a second disturbance was apparently advancing from the Pacific coast, causing general rains at stations west of the Rocky Mountains. An area of high pressure appeared over British Columbia and moved to the southeastward, while another area of high pressure covered the greater portion of the United States east of the Mississippi; between these high areas an extended barometric trough was formed, within which developed areas of low pressure traced as numbers vii and viii. On the afternoon of the 23d the centre of this disturbance was apparently north of Lake Superior, while a secondary disturbance developed in eastern Nebraska. The latter moved northeastward over the upper lake region as a feeble disturbance and disappeared to the northeastward during the 25th.

VIII.—This disturbance is traced on chart i as far to the westward as the central plateau region, but it probably originated to the west of the Pacific coast line. General rains prevailed in California during the 21st and 22d, the rainfall being unusually heavy in southern part of that state. The rains continued in California on the 23d after the centre had passed to the eastward of Nevada. The approach of an area of high pressure from the north apparently forced this disturbance to the southeastward, and it covered central Texas on the morning of the 25th, attended by heavy local rains. At this point the direction of movement changed to the northeast and it crossed the Mississippi Valley near Keokuk, Iowa, followed by a cold wave which extended southward to Texas and over the Lake region and central valleys. General rains occurred in the eastern portion of the United States, and rain and snow in the Lake region and Ohio Valley, while the centre of disturbance passed northeastward over the upper lake region. After leaving the Lake region the disturbance inclined towards the Saint Lawrence Valley and its energy increased with the easterly movement, the minimum pressure, 28.76, occurring on the morning of the 28th at Bird Rocks, Gulf of Saint Lawrence, and strong southwesterly gales were reported in the Maritime Provinces.

#### NORTH ATLANTIC STORMS FOR DECEMBER, 1888 (pressure in inches and millimetres; wind-force by Beaufort scale).

The paths of the depressions that appeared over the north Atlantic Ocean during December, 1888, are shown on chart i. These paths have been determined from international simultaneous observations by captains of ocean steamships and sailing vessels, received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

Nine depressions have been traced, of which seven passed eastward from the American continent; one first appeared

east of Newfoundland, and one apparently developed over mid-ocean, near the fiftieth parallel. The depressions generally pursued normal east to northeast paths, the exceptions being number 3, which moved east-southeast from Nova Scotia over the Azores; number 7, which advanced somewhat south of east after passing the thirtieth meridian, and number 6, whose path apparently described a loop over mid-ocean. From the 9th to the 13th a depression, which is traced as low area iii, moved from the Gulf of Mexico northeastward off the coast of